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09/935,994	08/23/2001	Richard E. Smalley	11321-P035US	1539

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EXAMINER
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KOPEC, MARK T

ART UNIT	PAPER NUMBER
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1751

DATE MAILED: 05/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/935,994	<b>Applicant(s)</b> SMALLEY ET AL.	
	<b>Examiner</b> Mark Kopec	<b>Art Unit</b> 1751	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-50 is/are pending in the application.
- 4a) Of the above claim(s) 2,7,14,19 and 47-50 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-6,8-13,15-18 and 20-46 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 August 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

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Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1, 3-6, 8-13, 15-18 and 20-46, drawn to a dielectric material, classified in class 423, subclass 445R.
- II. Claims 2, 7, 14, 19, 48 and 50, drawn to an anisotropic conductive material, classified in class 252, subclass 502.
- III. Claims 47 and 49, drawn to an electrically conductive non-coated composite, classified in class 252, subclass 511.

The inventions are distinct, each from the other because of the following reasons:

Inventions of Groups I, II and III are unrelated.

Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions have different modes of operation, different functions and different effects. This is clearly evidenced by the recitation of "dielectric" as opposed to "anisotropic" or "electrically conductive". Additionally, the

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coated and uncoated materials have different modes of operation and different effects.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art because of their recognized divergent subject matter and their different classification, and because the searches required for these distinct groups are not coextensive, restriction for examination purposes as indicated is proper.

During a telephone conversation with Mr. Ross Garson on 4/20/04 a provisional election was made with traverse to prosecute the invention of Group I, claims 1, 3-6, 8-13, 15-18 and 20-46. Affirmation of this election must be made by applicant in replying to this Office action. Claims 2, 7, 14, 19 and 47-50 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

The disclosure is objected to because of the following informalities: applicant should supply the co-pending serial numbers at page 1 of the instant specification.

Appropriate correction is required.

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple

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assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 24-65 of copending Application No. 09/935995. Although the conflicting claims are not identical, they are not patentably distinct from each other because both the instant claims and the above listed claims of 09/935995 are drawn to compositions comprising polymer-wrapped nanotubes dispersed in polymer matrix materials. The instant recitations of "dielectric" or "...change dimensionally" or "...capable of being modified" do not patentably distinguish over the claims of 09/935995 as such appear to be inherent from the random distribution (electrically isolated) of the wrapped nanotubes in polymer matrix.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

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The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

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2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 3-6, 8-13, 15-18 and 20-46 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kuper (2002/0092613).

Kuper (2002/0092613) discloses method for fabricating of macroscopic two or three dimensionally ordered arrays of single wall nanotubes (SWNTs) comprising the following steps:  
chemically treating purified SWNTs using the sol gel process to add chemically reactive groups to either the tube ends or tube

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bodies in order to functionalize the SWNTs; suspending the functionalized SWNTs in an appropriate liquid medium such that a colloid is produced; treating the colloid with a chemical or heat to promote coupling of the individual functionalized SWNTs to each other; and heating the coupled SWNTs to evaporate any excess liquid so as to provide a final product comprising an array of covalently bound functionalized SWNTs (Abstract). An embodiment of the invention is the inclusion with the above embodiments of a second substance to the sol-gel processing. This substance can be a polymer, epoxy, resin or ceramic material such that introduction of a colloidal suspension of the second substance to the colloidal suspension of the functionalized carbon nanotubes, with subsequent sol-gel processing on the mixture, yield a composite system. This composite system may have both components substantially aligned with respect to one another in a two or three dimensional fashion (page 3, para 0024). This synthesis is performed using known methods for side wall (tube body) functionalization of the carbon nanotubes and may include further modifications to the synthesis. For purposes of this disclosure, "chemical treatment" or "chemically treated" can include functionalization, (covalent attachment of organic functional groups), adherence of a surfactant molecule or wrapping of a polymer around the body of



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the tube. The sol gel process, as defined in this patent will include a sol of chemically treated SWNTs using the definition of definition of chemical treatment above (page 3, para 0027). The disclosed composite materials comprising polymer-wrapped single wall nanotubes dispersed in matrix materials either specifically or inherently meet each of the instantly claimed limitations regarding "dielectric" or "...change dimensionally" or "...capable of being modified".

The reference is anticipatory.

In the event that any minor modifications are necessary to meet the claimed limitations, such as minor variation in dielectric constant, such modifications are well within the purview of the skilled artisan.

Claims 24-46 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Bower et al (6,630,772).

Bower et al (6,630,772) discloses provides improved devices containing adherent carbon nanotube films, in particular electron field emitter structures containing such films. Previously, attaining even moderate adherence of powdery or mat-like nanotubes to a substrate was difficult, because of the perfect fullerene structure of nanotubes, which tend to exhibit no

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dangling bonds or defect sites where chemical bonding to the substrate is able to occur. The invention overcomes these problems, and provides a strongly adherent nanotube film, by a variety of fabrication processes (Abstract). According to the invention, adherent carbon nanotube films (containing single-walled and/or multi-walled nanotubes) are disposed on relatively flat conductive substrates. (Adherent film indicates a continuous film having a thickness of 0.1 to 100  $\mu\text{m}$  and having an adhesion strength of at least 1.0 kpsi, as measured by a conventional stud pull test using 0.141 inch diameter studs. Nanotube film refers to a film containing at least 50 volume percent nanotubes.) (Col 3, lines 39-44). It is also possible to mix pre-formed nanotubes with solvent to form a slurry and then deposit the slurry, e.g., by spin-on, spray, or printing techniques, onto a substrate having a surface layer containing carbon-dissolving or carbide forming materials. It is also possible to use a substrate having a low melting point material, i.e., less than 700.degree. C., such as aluminum. Such a process would result in "polymer wrapping" around the nanotubes materials. Subsequent heating induces either reaction of nanotubes with the carbon-dissolving or carbide forming materials or melting of the surface layer, such that the nanotubes are anchored to the substrate. It is also possible to form an

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adherent nanotube film by techniques such as mixing pre-formed nanotubes with solvent and binder, and optionally solder, and depositing the mixture onto a substrate. Subsequent heating will activate the binder and/or melt the solder to anchor the nanotubes to the substrate (Col 4, lines 10-25).

The disclosed composite materials comprising polymer-wrapped single wall nanotubes dispersed in matrix materials either specifically or inherently meet each of the instantly claimed limitations regarding "...change dimensionally" or "...capable of being modified".

The reference is anticipatory.

In the event that any minor modifications are necessary to meet the claimed limitations, such as selection of particular binder or fluid, such modifications are well within the purview of the skilled artisan.

Claims 1, 3-6, 8-13, 15-18 and 20-46 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Davey et al (6,576,341).

Davey et al (6,576,341) discloses purification of nanotube soot in a non-destructive and efficient method using a polymer having a coiling structure to extract nanotubes from their accompanying material without damage to their structure and with

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a high mass yield. Nanotube soot is added to a solvent which including a coiling polymer to form a solution. The solution is mixed with a nanotube composite suspension is formed with extraneous solid material such as amorphous carbon settling at the bottom of the solution. The nanotube composite suspension is decanted from the settled solid (Abstract). There is provided a composition which includes nanotubes and an organic material. Preferably the organic material has a coiling structure. The term "coiling structure" as used in this specification means a structure which facilitates the organic material wrapping about the nanotubes, that is capable of forming structures which wrap, coil, curve or bend around the nanotubes. The material may form strands and/or ropes for this purpose. The term nanotube as used in this patent specification is taken to mean any nanostructure and related materials. The organic material may comprise one or more polymer (conjugated and non-conjugated), oligomer (conjugated and non-conjugated) and monomer (conjugated and non-conjugated) or combinations thereof. The nanotubes which are mixed with these can be in the form of carbon nanotubes, nanotubes of other materials such as vanadium pentoxide for example, nanostructures (regular and undefined), as well as derivatives of these which can be based on or contain, as an example, Silicon, Boron, Tin, nitrogen, compounds

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of vanadium and oxygen such as vanadium pentoxide, etc. The nanostructures can have dimensions from nanometers in length to millimeters in length, as well as nanometers in width to micrometers in width. In a preferred embodiment of the invention the organic material is a polymer (Col 3, lines 1-24). According to another aspect of the invention there is provided a process for making a nanotube and organic polymer suspension comprising the steps of mixing a solvent with an organic polymer to form a solution having a desired viscosity, said viscosity being sufficient to suspend nanotube containing material to the solution, and mixing the nanotube containing material through the solution to form a nanotube and organic polymer suspension (Col 4, lines 1-6). See also figs 1-2 and examples 2-3.

Nanotubes can be used for static protection in a matrix with polymers and oligomers (Col 7, lines 62-63). The reference teaches various utilities including dielectric, conductive uses and EMI shielding (Col 8, lines 1 to Col 9, line 30). The disclosed composite materials comprising polymer-wrapped single wall nanotubes dispersed in matrix materials either specifically or inherently meet each of the instantly claimed limitations regarding "dielectric" or "...change dimensionally" or "...capable of being modified".

The reference is anticipatory.

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In the event that any minor modifications are necessary to meet the claimed limitations, such as minor variation in dielectric constant, such modifications are well within the purview of the skilled artisan.

In view of the foregoing, the above claims have failed to patentably distinguish over the applied art.

Applicant is reminded that any evidence to be presented in accordance with 37 C.F.R. 1.131 or 1.132 should be submitted before final rejection in order to be considered timely.

The remaining references listed on forms 892 and 1449 have been reviewed by the examiner and are considered to be cumulative to or less material than the prior art references relied upon in the rejection above.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Kopec whose telephone number is (571) 272-1319. The examiner can normally be reached on Monday - Friday from 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Yogendra Gupta can be reached on (571) 272-1316. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Mark Kopec  
Primary Examiner  
Art Unit 1751

MK

May 17, 2004